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Employment in Renewable Energy Activities, Australia

Employment in renewable energy activities reports on full time equivalent employment by state and territory and type of renewable energy

Reference period 2017-18 financial year

Released 17/04/2019

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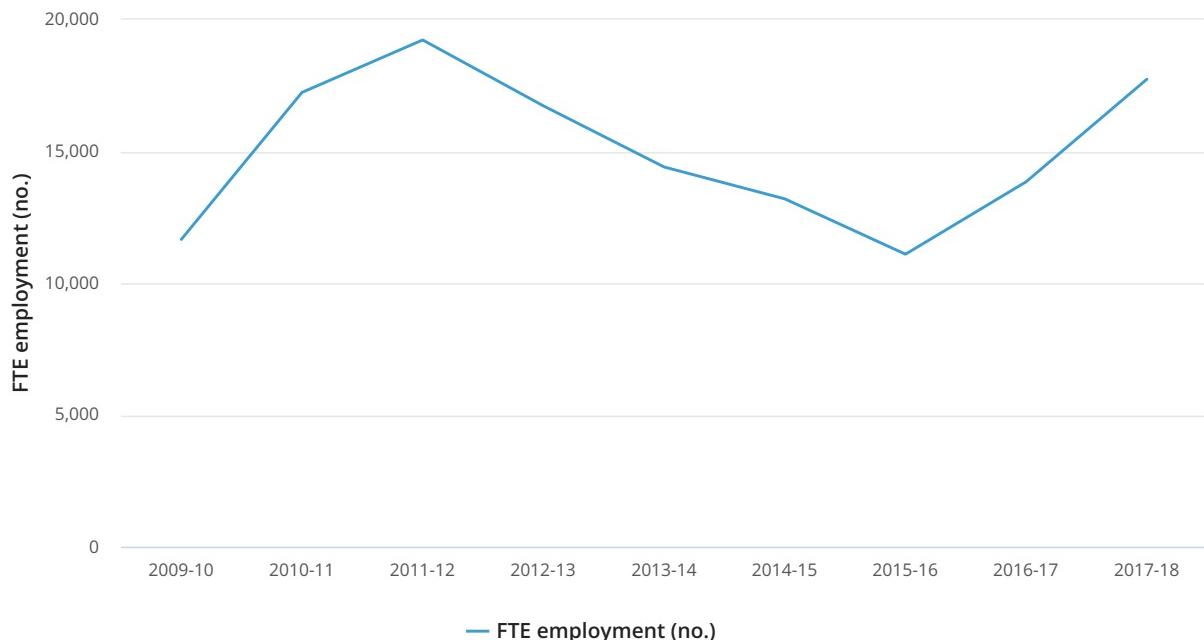
Main findings

This publication presents estimates of direct full-time equivalent (FTE) employment in renewable energy activities in Australia, for the years 2009-10 to 2017-18.

Overview

Annual direct FTE employment in renewable energy activities in Australia was estimated at 17,740 jobs in 2017-18. As Figure 1 shows, this is an increase of 3,890 jobs in FTE employment (28%) from the previous year (2016-17) and represents the highest level of FTE employment in renewable energy activities since 2011-12.

Figure 1 - Annual direct FTE employment in renewable energy activities in

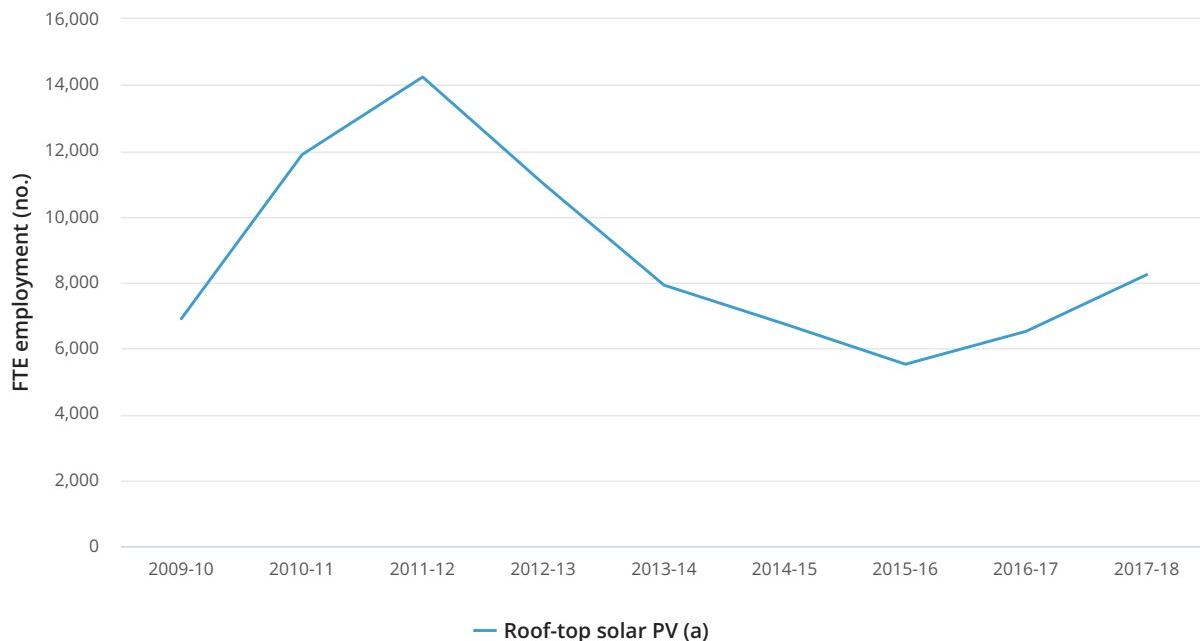


The increase in FTE employment in renewable energy activities between 2016-17 and 2017-18 has been driven by an increase in construction activity for large scale solar photovoltaic (PV) systems (1,950 additional FTE jobs) and roof-top solar PV (1,720 additional FTE jobs). Together, these two renewable energy types accounted for 94% of this increase in FTE employment in renewable energy. The only category to record a fall in employment between 2016-17 and 2017-18 was government and non-profit institutions (NPIs) (down by 50 FTE employees, or 5%).

Types of renewable energy

Roof-top solar PV remained the largest FTE employer among renewable energy types, comprising 8,240 FTE jobs or 46% of total FTE employment related to renewable energy in 2017-18. While employment in this category has fluctuated over time, it has been the largest single contributor in every year of the published time series. Its share peaked in 2011-12, when employment in roof-top solar PV made up 74% of total direct FTE employment in renewable energy activities, but its share has declined each year since.

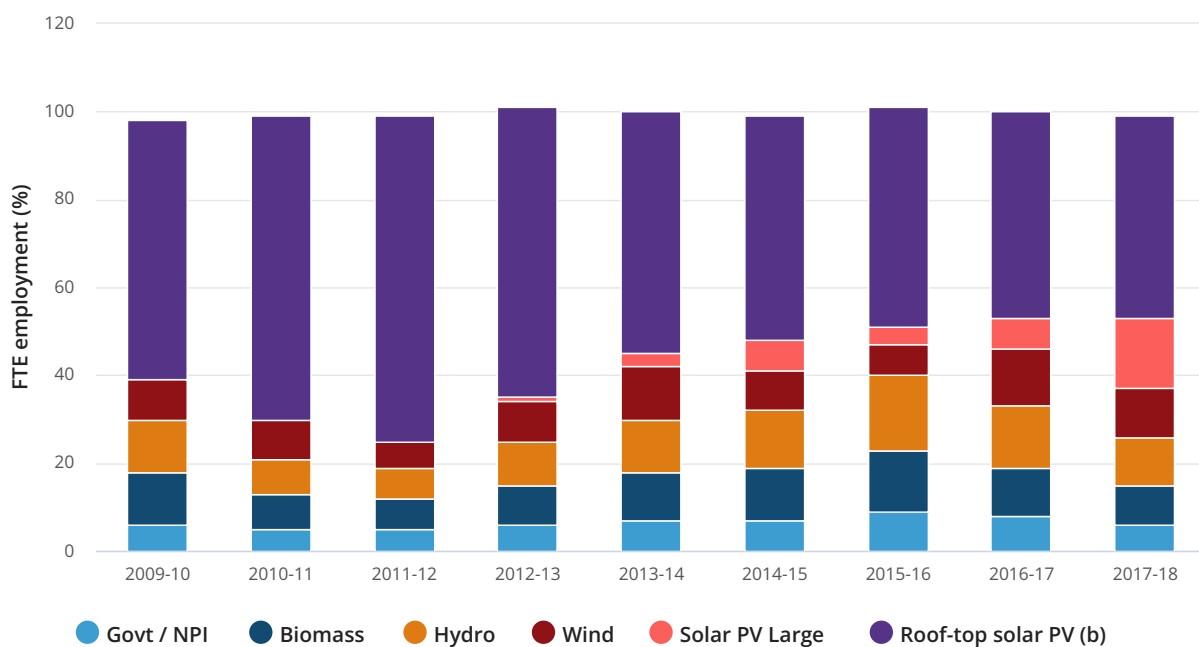
Figure 2 - Annual direct FTE employment in roof-top solar activities in Australia, 2009-10 to 2017-18 (a)



a. Includes solar hot water systems.

In 2017-18 large scale solar PV was the second largest contributor (after roof-top solar PV) to FTE employment related to renewable energy activities (16% of total) after contributing less than 1% in each year between 2009-10 and 2012-13. It experienced the largest increase in FTE employment of any renewable energy type between 2016-17 and 2017-18, increasing from 930 FTE jobs to 2,880 FTE jobs. This is despite there being an increase in the efficiency of developing large scale solar PV systems. Hydro electricity (2,020 FTE jobs), wind (1,890 FTE jobs) and biomass (1,650 FTE jobs) all made a significant contribution to total FTE employment in renewable energy activities in 2017-18.

Figure 3 - Proportion of annual direct FTE employment by type of renewable energy (a), 2009-10 to 2017-18



a. Excludes geothermal energy from total

b. Includes solar hot water systems

In Australia, hydro and biomass represent mature renewable energy sources, with much of their supporting infrastructure having been in place for some time. Employment in these areas is therefore relatively stable over the reported time series. In contrast, recent employment recorded against wind and solar energy - both roof-top solar and large scale solar - relates predominately to construction activity and is therefore more volatile, reflecting the fluctuation of energy infrastructure capital formation.

States and territories

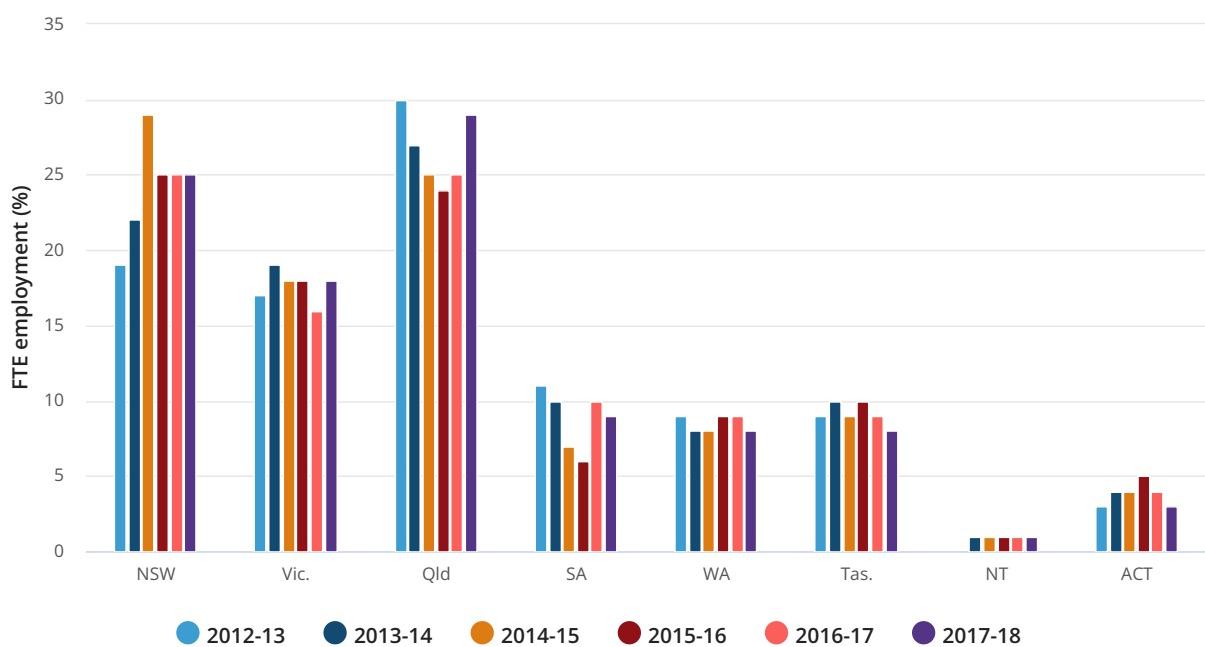
All states reported an increase in FTE employment related to renewable energy activities between 2016-17 and 2017-18, while both territories reported small declines. Queensland reported the largest increase (up by 1,550 FTE jobs), with Victoria and New South Wales reporting an increase of 1,020 and 950 jobs respectively. In Queensland and Victoria this

increase was mainly driven by the construction of large scale solar PV facilities, and in New South Wales mainly by construction of roof-top solar PV.

Among Australian states and territories, Victoria reported the largest percentage increase (47%) in FTE employment between 2016-17 and 2017-18, followed closely by Queensland (44%). New South Wales also reported strong growth in FTE employment in renewable energy activities (up 27%).

Together New South Wales, Victoria and Queensland accounted for 72% of all FTE employment in renewable energy activities in Australia in 2017-18.

Figure 4 - Proportion of annual direct FTE employment by state and territory, 2012-13 to 2017-18



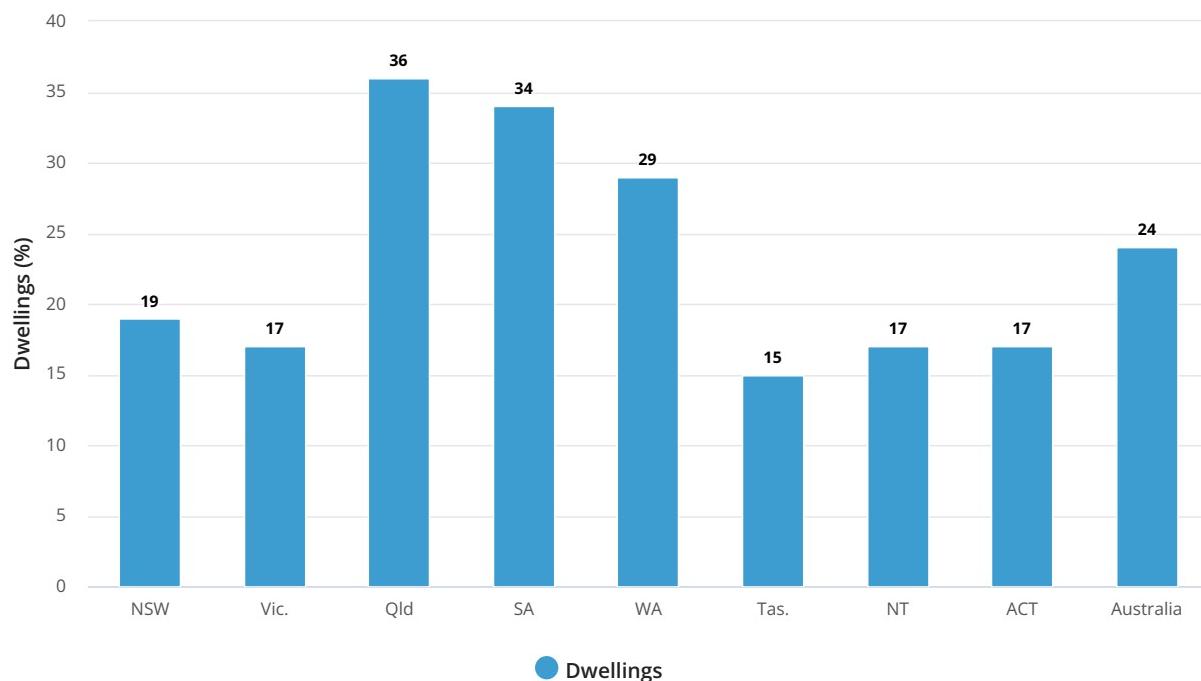
Penetration of roof-top solar PV across Australia

Levels of FTE employment supporting the installation of roof-top solar PV systems are influenced by various government policies, including taxes, subsidies, pricing policies and renewable energy targets.

Data from the Clean Energy Regulator (2019) reports that there were cumulatively over 2 million roof-top solar PV systems installed in Australia at the end of December 2018. This can be compared to the 2016 ABS Census of Population and Housing numbers of dwellings in Australia that are suitable for roof-top solar PV systems. This can broadly illustrate the coverage of roof-top solar PV systems into Australia's stock of private dwellings.

In Australia, 24% of suitable private dwellings were equipped with a roof-top solar PV system as at December 2018. A suitable dwelling is defined as a separate house or a semi-detached row or terrace house.

Figure 5 - Percentage of suitable dwellings with roof-top solar PV, 2017-18



The penetration of roof-top solar PV varies markedly across states and territories. For example, in Queensland 36% and in South Australia 34% of suitable private dwellings host a roof-top solar PV system. Victoria, the Australian Capital Territory and the Northern Territory each had 17% of suitable private dwellings host a roof-top solar PV system, while in Tasmania the proportion is 15%. Every state and territory in Australia recorded an increase in roof-top solar PV penetration between 2016-17 and 2017-18

Not all types of dwelling structures are suitable for hosting roof-top solar PV systems, for example, caravans, tents and many units and apartments. Some detached houses, terrace houses and townhouses have the structural capacity to host a roof-top solar PV system but are impractical for other reasons, such as a poor solar aspect. It is not possible to separately identify and exclude such dwellings.

Introduction

The amount of energy derived from renewable energy sources in Australia continues to grow. The Australian Bureau of Statistics (ABS) [Energy Account, Australia 2016-17 \(<https://www.abs.gov.au/AUSSSTATS/abs@.nsf/allprimarymainfeatures/E6B50E3835D8BF0ECA2584CC001B51A1?opendocument>\)](https://www.abs.gov.au/AUSSSTATS/abs@.nsf/allprimarymainfeatures/E6B50E3835D8BF0ECA2584CC001B51A1?opendocument) (cat. no. 4604.0) released in February 2019 reports that 380 petajoules (PJ) of energy was supplied from renewable sources in 2016-17, up from 240PJ in 2008-09. While the proportion of energy supplied from renewable sources in Australia remains small (1.6% in 2016-17), the proportion of electricity generated from renewable sources is significant and growing. The Department of the Environment and Energy (DoEE) in its [Australian Energy Update 2018 \(\[https://www.energy.gov.au/sites/default/files/australian_energy_update_2018.pdf\]\(https://www.energy.gov.au/sites/default/files/australian_energy_update_2018.pdf\)\)](https://www.energy.gov.au/sites/default/files/australian_energy_update_2018.pdf) reports that 16% of Australia's electricity was generated from renewable sources in 2016-17. There is considerable interest in renewable energy including interest in the amount of employment associated with renewable energy activities. This publication contains estimates of annual direct full time equivalent (FTE) employment in renewable energy activities for the years 2009-10 to 2017-18 for Australia and its states and territories. This project was funded by the [Australian Renewable Energy Agency \(ARENA\) \(<https://arena.gov.au/>\)](https://arena.gov.au/).

An important role of this publication is to establish guiding principles for understanding employment in renewable energy. These guidelines have been established in large part by following general accounting principles embodied in relevant international statistical standards: the 2008 edition of the [System of National Accounts \(2008 SNA\) \(<https://unstats.un.org/unsd/nationalaccount/sna2008.asp>\)](https://unstats.un.org/unsd/nationalaccount/sna2008.asp) and the 2012 Central Framework of the [System of Environmental-Economic Accounting \(SEEA-CF\) \(<https://seea.un.org/content/seea-central-framework>\)](https://seea.un.org/content/seea-central-framework). Estimates are also consistent with [guidelines concerning a statistical definition of employment in the environmental sector \(\[http://www.ilo.org/global/statistics-and-databases/standards-and-guidelines/guidelines-adopted-by-international-conferences-of-labour-statisticians/WCMS_230736/lang--en/index.htm\]\(http://www.ilo.org/global/statistics-and-databases/standards-and-guidelines/guidelines-adopted-by-international-conferences-of-labour-statisticians/WCMS_230736/lang--en/index.htm\)\)](http://www.ilo.org/global/statistics-and-databases/standards-and-guidelines/guidelines-adopted-by-international-conferences-of-labour-statisticians/WCMS_230736/lang--en/index.htm) produced by the International Labour Organisation. Appendix 1 of the guidelines describes how relevant international statistical standards have been interpreted and used to develop a notion of employment in renewable energy activities.

The International Renewable Energy Agency (IRENA) in [Renewable Energy and Jobs - Annual Review 2018](https://www.irena.org/publications/2018/May/Renewable-Energy-and-Jobs-Annual-Review-2018) (<https://www.irena.org/publications/2018/May/Renewable-Energy-and-Jobs-Annual-Review-2018>) publishes estimates of employment in renewable energy at global, regional and national levels. IRENA acknowledges the difficulties of drawing together disparate data on employment in renewable energy activities but does not offer a precise definition of renewable energy employment. Similarly, national estimates of employment in renewable energy jobs, both official and unofficial, typically provide only limited detail on those activities deemed to be 'renewable energy' activities. This publication systematically identifies, for each renewable energy type, the main activities considered to be in scope of employment in renewable energy activities. These activities typically range from manufacturing of equipment specific to renewable energy; installation of renewable energy infrastructure; and the operation and maintenance of this infrastructure. This publication includes employment in government agencies and non-profit institutions (NPIs) where this employment is predominantly motivated by support for renewable energy.

Appropriate estimation methodologies are required to support estimates of employment in renewable energy activities. National statistical agencies do not typically collect information on renewable energy employment directly from survey respondents since the burden on survey respondents and on statistical agencies can be considerable, especially given the difficulties in identifying an appropriate list of employing businesses. The ABS has estimated employment in renewable energy activities by using two techniques: firstly, by accessing information made publicly available on websites by renewable energy providers and other bodies; and secondly by utilising employment factors. The latter technique uses information on the amount of energy produced by renewable energy installations, numbers of installations and specific employment factors. Employment factors indicate the number of annual direct FTE jobs created per physical unit of choice. The technique is described more fully in the Methodology.

The estimates contained in this publication represent the outcome of development work requiring the use of assumptions and synthetic estimates for some data components, and are considered experimental. The ABS has sought and received valuable input from the statistical user community to develop the methodologies underpinning these estimates, in particular from industry experts and from relevant government agencies.

The ABS hopes that future editions of this publication will continue to benefit from the input of interested parties from industry, government, academia and the general community. As such, the ABS welcomes feedback on the estimates contained in this publication. Comments may be directed to environment@abs.gov.au (<mailto:environment@abs.gov.au>) or in hardcopy to:

Director, Centre of Environmental and Satellite Accounts, Physical Environment Accounts and Statistics Branch
Australian Bureau of Statistics
GPO Box 9817
Brisbane QLD 4001.

The [ABS Privacy Policy](https://www.abs.gov.au/privacy) (<https://www.abs.gov.au/privacy>) outlines how the ABS will handle any personal information that you provide to us.

Changes in this issue

A number of changes have been made by the ABS in this issue. These reflect ongoing ABS research into the measurement of employment in renewable energy activities, supported by valuable feedback from industry experts and government sources. The ABS is grateful for this feedback and will continue to actively seek and use stakeholder input.

Inclusion of employment related to large batteries

Large batteries have recently been installed to support power generation for Australia's electricity grid. These batteries represent an enabling technology in support of renewable energy and the employment required to put these batteries into operation is in scope of this publication. Battery-related employment is not separately identified in this release but is instead reported in combination with the type of renewable energy being enabled (wind power etc.).

Employment factors revised for wind power and large scale solar power

In this release, key employment factors used to estimate employment for wind power and large scale solar power have been revised downwards based on updated and improved source information. The change affects years 2015-16 and onwards.

Data downloads

Tables 1-12 Annual direct FTE employment in renewable energy activities

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[116.5 KB]

History of changes

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18/04/2019 - Y axis label was incorrect on Figure 5 - Percentage of suitable dwellings with roof-top solar PV, 2017-18 in the Main Findings. The label was changed from "FTE employment (%)" to "Dwellings (%)".

Methodology

[Employment in Renewable Energy Activities, Australia methodology, 2017-18 financial year](#)